

Archaeological research at *Grumentum* 2013: a three-dimensional documentation

Attilio Mastrocinque - Fiammetta Soriano -
 Chiara Maria Marchetti - Ine Jacobs

The results of recent archaeological excavations at Grumentum (Lucania) can be presented in a new way thanks to a series of 3D images. Below, three sectors are being presented, namely that of the round temple, the basilica, and buildings located southeast of the forum. The story of the round temple has been elucidated by a series of datable layers: a beautiful pavement of Augustan date was replaced by the temple, with a new pavement, in the Tiberian age. The story of the portico has not yet been satisfactorily ascertained. Several changes to its entrance are documented and there it is certain that its main transformation occurred in the central decades of the 1st century AD, when the abutting Capitol was built. In front of this temple another square was located, which may have been the republican forum. Close to the basilica an important stratigraphy has been brought to light, providing us with important chronological data. A period during which republican houses and shops occupied the border of the square was followed by great architectural works to build the basilica. The intention was to transform the square into a beautiful new forum. This occurred in the Augustan age, when the forum was planned and its construction was begun. To the south-east of the forum excavations uncovered two spaces, presumably shops, behind a street portico running parallel to the forum. All layers and features explored so far belonged to the late Roman/early medieval occupation phase of the area, which apparently followed a large-scale destruction of the structures.

Among the most difficult archaeological duties is explaining of what the excavation revealed. It can be very difficult to grasp what the Greeks called the ἐνάργεια (*enargeia*) and give a vivid and clear description of a thing or an event. Images, drawings, orthophotographs, vertical views, frontal views, sections, and other devices help to describe an archaeological context. More recently archaeological documentation has been implemented thanks to 3D images. For example, several scholars use 3D to document archeological finds¹. A few excavations have been using a laser scanner to document each stratigraphic unit. An alternative choice has been to document with 3D images created with software which joins many digital photographs². Those methods help with documentation but their use for presentation is limited. In fact, normal books and articles cannot provide readers with 3D images, and CDs delivered with books are perused with some difficulty in conjunction with the corresponding pages.

I propose an almost new method of presenting an archaeological situation, such as a layer, a group of stratigraphic units, a phase, but it is also useful in case of single contexts: stratigraphic units or important finds within a stratigraphic unit. We present here, as an experiment, a series of 3D images of several sectors in the field activities during 2013 in Grumentum (Grumento Nova, Potenza). The mission of the University of Verona, under my direction has been active in the forum of Grumentum since 2005. In 2013 a summer school on 3D images in archaeology was organized. The co-operation of the photogrammetry laboratory CIRCE of the University IUAV (Venice) was vital for the success of the school. Subsequent activities have been supported by 3D documentation, partially realized with aerial photography. Photoscan and other softwares have been used to realize and manage the images. Subsequently a relatively low resolution has been used in order to obtain lighter files. They correspond to the reality with an approximation of ± 1 cm. The plan was to document several layers together with their monumental context in or-

¹ For big finds such as a ship as well; see for ex. REMOTTI-CERAMI-GENNAI 2010.

² On the benefit from a 3D documentation of extant monuments: CAMPANA-REMONDINO 2007, where a rich bibliography can be found; FERDANI 2012; cf. also LIMONCELLI 2010; FIORINI-ARCHETTI 2011.

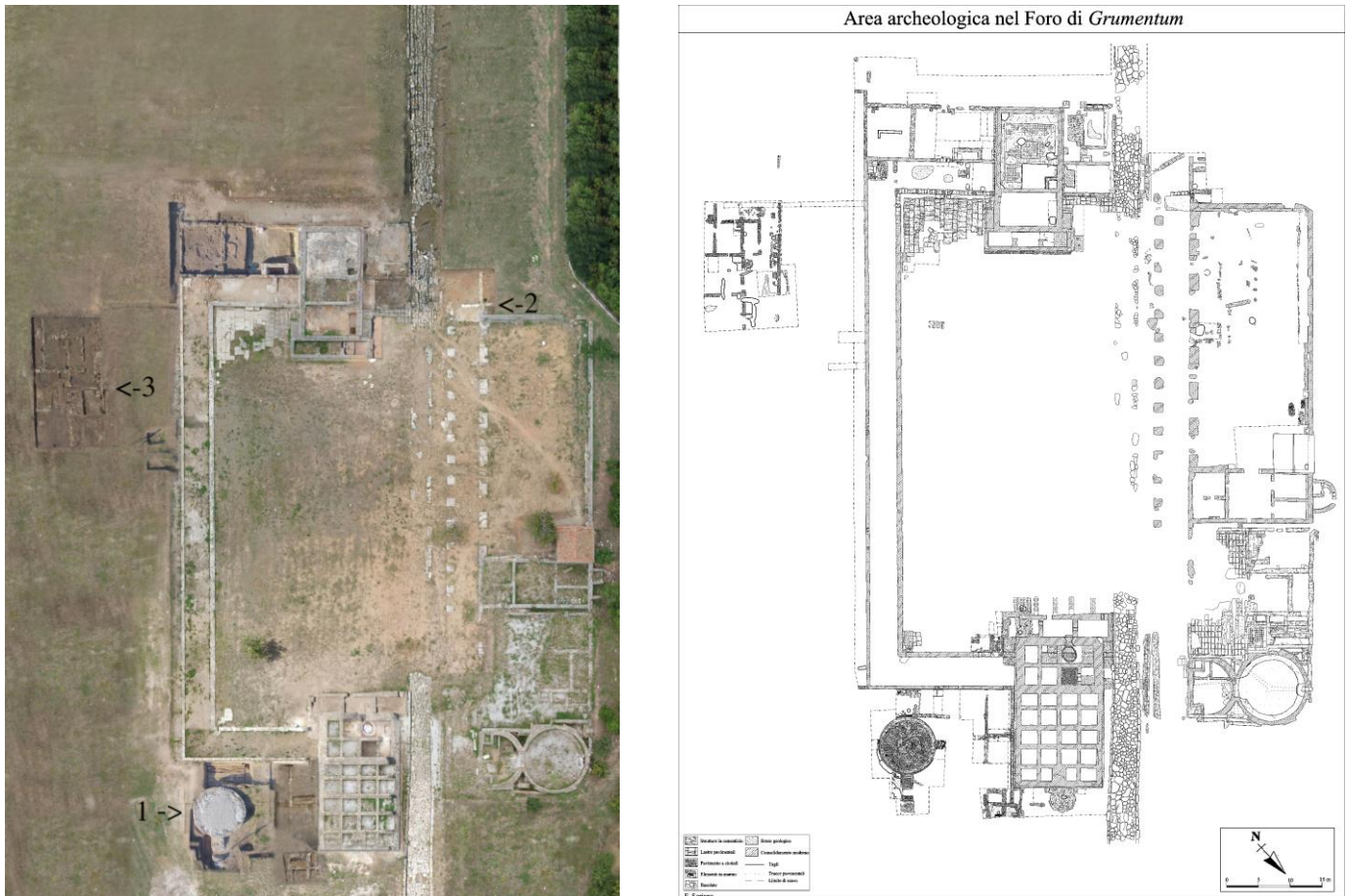


Fig. 1. a. Orthophoto of the forum and adjacent areas. b. Plan of the forum and adjacent areas.

der to show their location, depth, and overall situation. It is possible as well to see both the context and the remains of stratigraphy on perimetral walls. My intention is to improve this sort of documentation in the forthcoming seasons³.

Three sectors will be discussed here, marked with numbers on the orthophoto (fig. 1a, see also the plan in fig. 1b)⁴. In these sectors excavations were carried out, namely in the area of a round temple, of the basilica, and of several buildings near the forum.

Attilio Mastrocinque

Sector M (the round temple): campaign 2013 (fig. 1a, no. 1)

Many campaigns have been devoted to sector M⁵ in the area of the forum of Grumentum. Here an architectural complex over ca 600 m² has been partially explored, and a round building (Structure H) (fig. 2) has been brought to light. This proved to be a temple surrounded by a portico.

In this article we will discuss the stratigraphy encountered during the 2013 campaign in trenches 4 and 8 (fig. 3). The investigations were aimed at clarifying the architectural phases in this part of the complex. In addition, we aimed to discover evidence of early human activity on this location⁶.

³ All of the images were produced by Mastrocinque: FOLDER is ideally placed to disseminate 3D documentation and creating for an electronic way toward the ἐνάργεια.

⁴ 3D images can be opened with many applications, including Adobe Reader. To rotate an image, move the mouse or trackpad in the intended direction; to move an image, press "control" and move the mouse or trackpad. If the icon appears white, click on the right of the mouse, choose "options" and then "visible dimensions" or "zoom".

⁵ The sector M has been investigated since 2006; see: SARACINO *et al.* 2009: 302-314; SARACINO *et al.* 2010: 239-251; SARACINO, SORIANO 2013: 134-137; SORIANO, SARACINO forthcoming.

⁶ We will describe the stratigraphy from the early phases to the most recent, starting with trench 4 and continuing with trench 8.

Fig. 2. Round temple north-east of the forum.

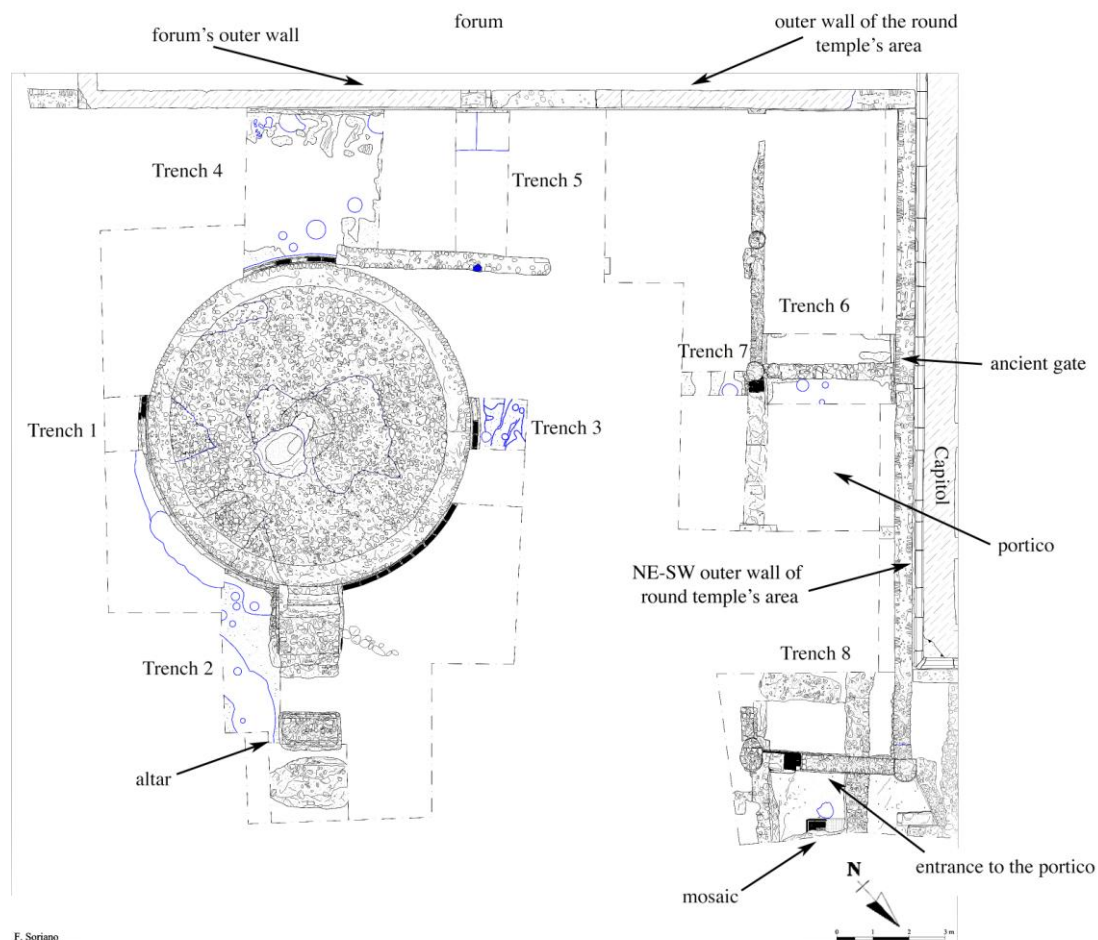


Fig. 3. Plan of the sector of the round temple with trenches nos. 1 to 8.

Trench 4

Trench 4⁹, between the temple and the SW wall¹⁰, presented a complex stratigraphy from the first century BC to the fifth century AD¹¹. In particular, during the 2012 and 2013 campaigns, four occupation levels could be recognized. They will be in chronological order.

On top of the natural geological layer a deep deposit of clay represented the oldest evidence of human activity. Between 75 and 50 BC this deposit was covered with a solid floor of beaten earth¹² (fig. 4). This surface was in a later stage cut by postholes. In the second half of the first century BC it was covered by a mortar floor (fig. 5), also marked by postholes of different sizes¹³.

Between the end of the first century BC and the beginning of the first century AD concrete foundations for an *opus reticulatum* wall with a NW to SE orientation, located SW of this area, were laid¹⁴ (see fig. 2). This wall constituted both the northern border of the forum and the SW limit of the investigated sector M (visible at the top of fig. 3). In this phase the previous pavement went out of use and the walking level of the area was elevated by depositing several layers on which a new pavement was laid out. In the late Augustan era this floor was restored and partially substituted by a new surface. These early floors, along with the results from the magnetometric prospections in the area¹⁵, suggest the existence of an open space, probably another square, outside and next to the known forum. The

⁹ I am grateful to Dr. Rossana Scavone for her invaluable help during the campaigns 2010-2013, and to Dr. Chiara M. Marchetti for her suggestions concerning the different floors.

¹⁰ This is the outer wall of the forum on its north side.

¹¹ I am grateful to Dr. Roby Stuardi and Dr. Barbara Lepri and Elisa Zentilini for the preliminary information concerning finds from Sector M (campaigns 2011-2013). On the latest phases: CIRELLI 2013: 137-141.

¹² This layer has also been detected in Trenches 2, 3, 6, 7 e 8; see also FUSCO 2009, pp. 177-181; FUSCO 2013: 247-253.

¹³ The layer has a depth from 1 to 6 cm. Both the beaten earth soil and the mortar soil were recognized in trenches 2, 3, 6, 7 and 8; see also FUSCO 2009: 181-182; FUSCO 2013: 253-255.

¹⁴ The foundation was laid by filling up a trench that cut the layers described above down to bedrock.

¹⁵ See MASTROCINQUE, SAGGIORO 2012.

Fig. 4. Early surface of beaten earth with probable postholes.

Fig. 5. Early mortar surface, Augustan period.

round temple and a fountain were constructed on top of this square.

The mortar floors of the late Augustan age display elongated and parallel cuts with a regular interdistance. They can maybe be interpreted as ruts of carts, perhaps the carts used for the building of the round temple (fig. 6). In fact, during the first half of the first century AD, a *podium* covered by *opus reticulatum* and marmor slabs, and decorated with a moulded cornice were laid out on top of concrete foundations¹⁶ (fig. 2).

The area surrounding this temple was smoothed with some fill layers, over which a new mortar floor was laid. In this phase the wall behind the temple was covered with colored plaster, whose lower part is partially preserved. Over an ochre yellow skirting there are traces of a dark blue landscape and a yellow and white lattice fence. This is the well-known typology of garden scenography, used, in this case, to let a visitor see the round temple, with its altar and staircase in the foreground and an image of a garden in the background.

Trench 8

Since 2011 excavation has focused on the N area of the sector as well, where several walls and other architectural elements came to light¹⁷. In particular, Trench 8, in the N corner of sector M, clarified the stratigraphic and architectural sequence¹⁸ (fig. 7).

Several foundations were uncovered in 2013. They belong to a NE-SW wall in *opus reticulatum*¹⁹. At the northern end of this wall is a brick pilaster, covered with coloured plaster and semicircular at its eastern, or outer face. A second semicircular pilaster was discovered 3,70 m. away, with a brick semicolumn joined to its inner face. This architectural device belonged to a portico, of which two brick columns and a pilaster projecting from the S-W wall were already known. These four elements are oriented NE-SW and, together with the data from geophysical survey²⁰, show that the temple was flanked on both sides by a columned portico. The temple overlooked the square, and had two entrances to the aisles of the portico, with a supplementary gate at the centre of the outer NW wall.

At the end of the portico the wall was decorated with coloured plaster, whose scanty remains are still visible. The decoration was in the third Pompeian style, with red and blue rectangular areas within white frames over a dark blue skirting.

Parts of mortar floors were discovered in Trenches 6 and 8²¹. The intercolumnia²² were paved with *opus sectile*, whose marble slabs still remain in some parts, while imprints of others are visible. In a subsequent phase the portico was restored and modified. The northern gate was closed and the entry to the northern portico was narrowed by an *opus reticulatum* wall, with brick quoining²³. The marble threshold is preserved, with a hole for the door pivot. In this phase the *intercolumnia* were closed by *reticulatum* walls and several cross walls which created rooms.

Shortly afterwards, a new room was built out into the square, abutting the pre-existing northern wall and using a new NNW-SSE oblique wall in *opus reticulatum* that was plastered and coloured. This room has an *opus signinum* floor with, on the N side, a mosaic coloured white, sky-blue, orange, red, blue, and violet. This room was probably entered from the N by descending two stairs covered with tiles and plaster.

During the building of temple D (the *Capitolium*) in the middle of the 1st century AD, the NW wall of the portico and its colonnade were eliminated. The other aisle of the portico probably underwent the same treatment. In the second century AD several fills brought up the level of this area.

Between the second and the fifth centuries AD the area of the porch was deeply modified. In the area of Trench 8 the level was raised and perhaps a stair was added to the two pre-existing ones. Shortly afterwards two new NE-SW walls were built; of which concrete foundations, in mortar with a few stones and fragments of brick sherds, are preserved. Finally, during the Middle Ages, a wall in pebbles, fragmentary bricks and a little mortar was built out of the northern entry of the porch, starting from the left jamb and going NE-SW toward the square.

Fiammetta Soriano

¹⁶ The foundations are straight and simple and they cut the pre-existing layers.

¹⁷ After cleaning the area and taking away a large modern fill we recognized several walls in *opus caementicium*. (Pl. I).

¹⁸ Trenches 6, 7 and 8 provided us with a stratigraphic sequence from the first century BC to the fifth AD. We will describe the structures which correspond to the phase of temple building and the subsequent ones.

¹⁹ This wall was already discovered in 2006 (FUSCO 2009: 183-188).

²⁰ The prospections showed, at the SE side of our sector, a symmetrical structure with the same orientation. See MASTROCINQUE, SAGGIORO 2012.

²¹ The makeup layers and the floors provided us with finds which are datable to the first half of the first cent. AD.

²² Trenches 6-7.

²³ The dig has brought to light the short concrete foundations, and a surface of beaten earth which is joined to the cut of the foundation. This surface can be dated to the middle of the first century AD.

Fig. 6. Remains of ruts which cut the second Augustan surface, after its restoration.

Fig. 7. Panoramic view of the north-western portico of the round temple. The apparent cross formed by walls is the entrance to the portico with later walls which narrowed the entrance. On the border of the image the podium of the capitol is visible, on whose limit remains of the perimetric wall of the portico can be seen. An apparently L-shaped structure is located close to this wall. It is formed by the stylobate of the portico and an orthogonal inner wall.

Excavation in the basilica 2013 (fig. 1a, no. 2)

The western side of the forum has been investigated since 1995 and has received increasingly more attention through time because of the two major buildings located there, the probable curia and the basilica. The aim of the latest campaign was to establish the chronology of the basilica, hitherto dated on the basis of typological comparisons (fig. 8). A trench 2,5 x 1,5 m has been dug close to the western wall of this building, adjoining an area where the Soprintendenza per i Beni archeologici della Basilicata, under the direction of Maria Luisa Nava²⁴, had carried out other excavations. The new research allows us to understand many finds in this zone. The noteworthy results will be presented below, synthesizing old and new data. The trench shows five main phases which can be assigned to a period running from the beginning of the second century BC to Late Antiquity.

The bottom of the trench was a clayey layer almost totally devoid of human artifacts (fig. 9). Over this a deep layer was deposited, consisting of clay, which modified the original morphology of the central longitudinal plain of the city. This layer can be dated to the early second century BC: similar layers have been discovered in other locations along the western side of the forum (phase 1)²⁵.

Between the end of the second and the beginning of the first century BC this layer was cut by the foundations of two perimetral walls, forming the corner of a large house uncovered in 2003 by M. L. Nava (phase 2)²⁶. The building was located parallel to the main road (the so-called *decumanus*) and was part of a large residential neighborhood which occupied the western side of the square from the middle of the second century. Its foundations were made of river pebbles, stone chips, and fragments of tiles bound with mortar. In the second phase a mortar floor was laid outside the building (fig. 10). At the beginning of the first century BC this neighborhood appears to have been divided according to a regular building plan, and the houses were probably provided with *tabernae* along the road. This arrangement lasted until the end of the first century BC. There are other remnants of this building activity, namely 1) the so-called "Lucanian house", which was discovered in 2003 and further investigated by myself during the VI campaign of the University of Verona²⁷, and 2) three *domus* which were brought to light by H. Di Giuseppe and G. Ricci close to the curia²⁸.

The neighborhood was transformed during the Augustan period, when public and private buildings were built here, within a general phase of renewal of the city and the creation of the forum. Previously one could only say that there was a square, not a true forum. Among the new buildings was the basilica: a large rectangular hall (ca. 41 x 17 m), preceded by a porch, and facing the centre of the forum, on its western side. The older private houses were eliminated.

The mortar floor of the second phase was partially cut away by the foundation of the western wall of the basilica. Onto this floor a layer of chips of both *cubilia* and bricks was laid (fig. 11), in order to prepare a new mortar floor (phase 3).

A narrow corridor was thus created between the old wall with pebble foundations of phase 2 and the western wall of the basilica. This corridor was used as a rubbish dump and consequently filled up with broken ceramics and animal remains (phase 4). According to M. L. Nava, the house was destroyed by a fire causing a collapse, which occurred under Domitian, as suggested by a coin²⁹ found under the collapse³⁰. We do not know whether a new building was created in the area of the collapse. At a still unknown moment in Late Antiquity the surviving remains of walls were removed and the robber trenches filled, covered by many layers that abutted the western wall of the surviving basilica (phase 5).

Chiara Maria Marchetti

Grumentum 2013, Sector S (buildings near the forum, eastward). Preliminary overview of main phases (fig. 1a, no. 3)

The trench excavated by V. Scalfari in 2009 and 2010 was this year extended to the northeast with an area of similar surface, measuring ca. 15 by 15 m. Its size was determined by the desire to have a large overview, in order to be able to reconstruct the plan of the building or buildings occupying this location, to check the continuation of walls discovered in 2009-2010 and the further continuation of the row of piers discovered by Scalfari in 2009 and 2010, as well as in the small trench of 2012. These goals were realised. However, due to the large size of the trench, only the latest occupation phases of the area could be explored.

²⁴ NAVA 2004: 990-1.

²⁵ RICCI in DI GIUSEPPE, RICCI 2009: 138; CAMERLENGO, MARCHETTI forthcoming.

²⁶ NAVA 2004: 991. Maria Luisa Nava believed that it was a forge, which carried out its activities between the second/first centuries BC to the second century AD. and that it specialized in luxury objects.

²⁷ This project was carried out with Lianka Camerlengo and will be published in the forthcoming proceedings of the conference *I Romani e la Lucania*.

²⁸ DI GIUSEPPE, RICCI 2009: 141-144.

²⁹ RIC² II, no. 668.

³⁰ NAVA 2004: 990.

Fig. 8. Panoramic view of the basilica with archaeological activities being carried out on the SW corner.

Fig. 9. Clay layer in the trench between the basilica and the republican house.

Fig. 10. Foundation trench for the basilica of the Augustan period, after the removal of the fill.

Fig. 11. Fill of the trench for the foundation of the basilica, makeups laid to elevate and smooth the related surface.

The following relative sequence of events could be reconstructed:

1) Two walls with a SE-NW orientation as well as two walls with a NE-SW orientation were discovered (designated as 6261, 6262 and 6263, 6264 respectively on fig. 12). Their relative chronology is not yet clear, but they will be explored by means of soundings next year. In addition, in the west of the trench, we uncovered the top of yet another pier (6266), aligned with those discovered in 2009, 2010 and 2012. However, the orientation of this northernmost pier is slightly different, as is its size; at 0,94 x ,59 m, it is larger than all those further south (fig. 13). The piers in all likelihood belong to a portico with NE-SW orientation, running parallel to the long side of the forum, the back wall of which is formed by walls 6263 and 6264. For the moment, it seems that two door openings were present in the back wall, leading into two spaces behind the portico, presumably shops. The two spaces excavated in 2013 were separated by wall 6261/6262, though connected to each other by a door.

2a) The walls in the eastern part of the trench apparently collapsed at a certain moment in time. A large amount of destruction material was spread out to the south of the walls.

2b) This destruction material was never removed (fig. 14), but instead it was decided to create a new surface at a much higher level (fig. 15). For this purpose, a thick deposit of yellow clay was brought in, filling the depressions created by the collapse. This clay was clearly present in the south of the excavation trench, as well as in the door opening connected the two spaces behind the portico, but appears to be absent or located at a much lower level in the northern space, where a darker layer appeared. Yellow clay was also found in the western part of the trench. In this area, however, the situation is much less clear due to later interventions, among them many shallow trenches with a NE-SW orientation, which may be the result of later ploughing. The same conclusion was already reached in the small sounding dug last year. In the remainder of the excavation area later trenches were cut through the yellow clay as well as through the walls. These in general have no logic at all: they are of different dimensions and diverging orientations. They are also deeper than the regular, parallel trenches found in the western part of the excavated area.

2c) To the west of wall 6263, a completely new floor was laid out (designated as 6248 on fig. 12), which partially abutted and partially covered the previous surface. The floor consisted mainly of brick fragments, but also of some small rounded stones. These appear to be either destruction material or in any case reused material. The rounding of the constituent elements indicates that this floor stayed in use for quite some time.

2d) In between the elements of the new floor and the floor level installed on top of the collapse, a considerable amount of archaeological finds was discovered, among which a large quantities of animal jaws. In addition, there were a number of ceramics, generally coarsewares, and further animal bones on top of the new floor. Although it seems that most of the walls were rebuilt during this last phase of occupation, wall 6263 was covered by the yellow clay. Consequently, a very large room seems to have come into existence in the last period of occupation.

3a) Eventually, the area became covered by a thick packing of clayey-loam, dark in colour. The upper part of all the Roman structures was destroyed by agricultural activity. A concentration of building materials could be found on top of and surrounding the ancient walls and the pier.

3b) In this post-Roman period the above-mentioned network of trenches was dug. A piece of late 13th-14th century maiolica testifies to occupation of the area during this period.

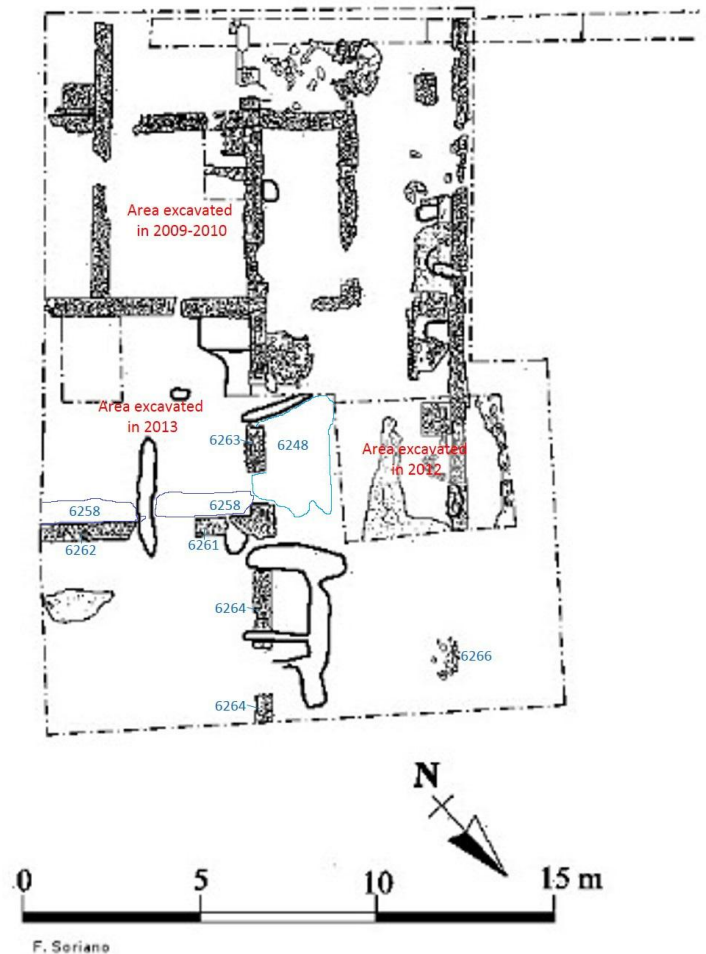


Fig. 12. Sketch plan of the area to the southeast of the forum.

Fig. 13. General view of the buildings excavated to the south of the forum at the end of the 2013 excavations.

Fig. 14. General view of the buildings excavated to the south of the forum, third week of the 2013 excavations.

Fig. 15. View of the areas to the south of the forum excavated in 2009, 2010 and the sounding of 2012.

Attilio Mastrocinque

Università degli Studi di Verona
E-mail: attilio.mastrocinque@univr.it

Fiammetta Soriano

Università degli Studi di Verona
E-mail: fiammettasoriano@hotmail.it

Chiara Maria Marchetti

Università degli Studi di Verona
E-mail: chiamaria.marchetti@gmail.com

Ine Jacobs

University of Edinburgh
E-mail: Ine.Jacobs@ed.ac.uk

BIBLIOGRAPHY

- CAMERLENGO L., MARCHETTI C.M., forthcoming, *La cosiddetta 'Casa Lucana' di Grumentum (PZ) presso il lato occidentale del Foro. Dati preliminari dal saggio A*, in *I Romani e la Lucania*. Atti del Convegno di studi Verona 2012: forthcoming.
- CAMPANA S., REMONDINO F., 2007, *Fast and Detailed Digital Documentation of Archaeological Excavations and Heritage Artifacts*, in *CAA 2007* (www.cyi.ac.cy/system/files/campana_remondino_CAA07.pdf)
- CIRELLI E., 2013, *Le produzioni ceramiche*, in E. CIRELLI, F. SAGGIORO, M. SARACINO, F. SORIANO, *Grumentum nell'altomedioevo: stratigrafia produzione ceramica e topografia a confronto*, in A. MASTROCINQUE (ed.), *Grumentum e il suo territorio nell'antichità*, BAR IntSer 2531: 137-141.
- DI GIUSEPPE H., RICCI G., 2009, *L'angolo nord-occidentale del Foro di Grumentum. Una proposta interpretativa*, in A. MASTROCINQUE (ed.), *Grumentum Romana*, Moliterno: 138-140.
- FERDANI D., 2012, *Dense Stereo matching based Systems in Archaeology: Applications, Benefits and Limitations*, 2012 (http://lnx.mimos.it/mimos_decennale/Proceedings/BeniCulturali2_04_Ferdani.pdf and in other internet sites)
- FIORINI A., ARCHETTI V., 2011, *Fotomodellazione e stereofotogrammetria per la creazione di modelli stratigrafici in archeologia dell'architettura*, in *Archeologia e Calcolatori* 22: 199-216.
- FUSCO U., 2009 (con i contributi di: V. Roccella, G. Bognandi, B. Lepri, R. Schiavone, F. Soriano), *La stratigrafia archeologica presso il Tempio D, campagne di scavo 2005-07*, in A. MASTROCINQUE (ed.), *Grumentum romana*, Atti del Convegno di studi su *Grumentum romana*, Grumento Nova (PZ) Salone del Castello San Severino 28-29 giugno 2008: 177-181; 181-182; 183-188.
- FUSCO U., 2013, *La piazza del Foro di Grumentum (campagne di scavo 2008-09): sequenza stratigrafica e sintassi spaziale*, in *NSA XX-XI*: 247-253.
- LIMONCELLI M., 2010, *Lettura stratigrafica e ricostruzione 3D della chiesa*, in *Il complesso tardo-antico e alto-medievale dei SS. Cosma e Damiano, detto Le Centoporte, Giurdignano (LE). Scavi 1993-1996 a cura di P. Arthur & B. Bruno*, Galatina (Lecce): 107-111.
- MASTROCINQUE A., SAGGIORO F., 2012, *Magnetometry at Grumentum in Ancient Lucania*, in www.fastionline.org/docs/Folder-it-245.pdf.
- NAVA M.L., 2004, *L'attività archeologica in Basilicata nel 2003*, in *Alessandro il Molosso e i "condottieri" in Magna Grecia*, Atti del XLIII Convegno di Studi sulla Magna Grecia (Taranto-Cosenza 26-30 settembre 2004), Taranto: 935-1000.
- REMOTTI E., CERAMI E., GENNAI F., 2010, *Dal disegno archeologico alla documentazione grafica tridimensionale: lo sviluppo delle tecnologie di grafica multimediale al servizio dell'archeologia, del restauro e della fruizione*, in *GRADUS* 2010/ 5.1: 31-38.
- RIC²: *The Roman Imperial Coinage*, ed. by H. MATTINGLY and E. A. SYDENHAM, 2nd vol., 2nd ed. London 2007.
- SARACINO M., BOTTURI C., PERRETTI T., POZZANI L., SORIANO F., 2009, *Il tempio rotondo presso il settore M, area Foro*, *Grumentum: indagini archeologiche e risultati preliminari*, in A. MASTROCINQUE (ed.), *Grumentum romana*, Atti del Convegno di studi su *Grumentum romana*, Grumento Nova (PZ) Salone del Castello San Severino 28-29 giugno 2008: 302-314.
- SARACINO M., CIANCIARULO D., PERRETTI T., SORIANO F., 2010, *Indagine archeologica presso il settore M, area Foro (Grumentum): dati preliminari*, in F. CANDELATO, C. MORATELLO (edd.), *Archeologia Storia Tecnologia*, Ricerche storiche e archeologiche dell'Università di Verona. Progetto integrato per l'applicazione di tecnologie a

vanzate ai fini del recupero, dello studio e della fruizione dei beni archeologici, “Atti del convegno di Verona 23-24 maggio 2008”, Verona: 239-251.

SARACINO M., SORIANO F., 2013, *La sequenza stratigrafica del settore M*, in E. CIRELLI, F. SAGGIORO, M. SARACINO, F. SORIANO, *Grumentum nell'altomedioevo: stratigrafia produzione ceramica e topografia a confronto*, in A. MASTROCINQUE (ed.), *Grumento e il suo territorio nell'antichità*, in *BAR* ser. 2531, 2013: 134-136.

SORIANO F., SARACINO M., forthcoming, *Novità dalle recenti campagne di scavo nell'area archeologica di Grumentum, settore M*, Convegno di studi su “I Romani e la Lucania. Nuove prospettive di ricerca”, Verona Dipartimento di Tempo Spazio Immagine e Società, 11 maggio 2012: forthcoming.